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FIVE NEW BERRY-FRUITED SPECIES OF  
TROPICAL AMERICAN MELASTOMATACEAE

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**ABSTRACT:** Five species of berry-fruited Melastomataceae are described as new: *Blakea fuchsioides* from western Panama; *Clidemia hammelii* from Costa Rica, Panama, and western Colombia; *Miconia calocoma* and *M. dissitiflora* from Costa Rica; and *Tococa croatii* from eastern Panama. Predaceous mites of the genus *Ololaelaps* are recorded as residents in the foliar pocket domatia of *C. hammelii*. This is the first report of an association between a mite and a species of Melastomataceae. Discussions, distributional notes, and diagnostic illustrations are provided for each of the species.

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INTRODUCTION

Ongoing field work in little-explored areas of Central America and the study of numerous collections sent for identification continue to yield many new taxa among the berry-fruited genera of Melastomataceae. In this paper I describe new species in *Blakea*, *Clidemia*, *Miconia*, and *Tococa*. The taxonomic notes and discussions included here emphasize the diagnostic characters that make each of the new species unusual or anomalous additions to their respective genera.

**Blakea fuchsioides** Almeda, sp. nov.

Figure 1

TYPE:—PANAMA. Chiriquí: La Fortuna area, ca. 7 mi N of Los Planes de Hornito in forest along small draw, elev. 3,600 ft (1,097 m), 26 Aug. 1983, Hammel & Kress 13473 (holotype: CAS!; isotype: DUKE).

Frutex epiphyticus. Ramuli sicut petioli folia subtus inflorescentia hypanthiaque modice pilis castaneis laevibus (0.5–) 1–1.5(–2.5) mm longis armati. Petioli 0.8–2.4 cm longi, lamina 3–8.9 × 2–4.7 cm elliptico-ovata vel ovata apice acuminata basi rotundata vel subcordata. 5-nervata, membranacea vel

subcoriacea et integra vel obscure dentata. Flores 6-meri in quoque nodo superiore singuli vel bini, pedicellis 3.2–11.5 cm longis, bractaeae elliptico-lanceolatae; bractaeae exteriores 3–4.5 × 1 cm acutae liberae; bractaeae interiores 2.2–3.5 × 0.9–1.2 cm acutae liberae. Hypanthium (ad torum) 5–7 mm longum extus strigillosum; calycis tubus 5 mm longus, lobis 4–6 mm longis. Petala 19–23 × 14–15 mm elliptico-ovata apice rotundata. Filamenta 5–7 mm longa; antherae 2–3.5 × 2 mm oblongae lateraliter non cohaerentes apicaliter biporosae; connectivum dorsaliter ca. 0.5 mm supra thecarum basim inconspicue tuberculatum. Stylus 1.8–3.2 cm; ovarium 6-loculare omnino inferum apice glabro (cono et collo non evoluta).

Pendent viny epiphytes or hemiepiphytes adhering to the bark of host trees by adventitious roots. Older cauline internodes glabrate, terete, becoming striate or cracked in age. Distal indument of smooth rusty brown hairs (0.5–) 1–1.5(–2.5) mm long. Leaves of a pair slightly unequal in size; petioles 0.8–2.4 cm long; blades membranaceous to subcoriaceous, 3–8.9 cm long and 2–4.7 cm wide, elliptic-ovate to ovate, acuminate at apex, broadly rounded to subcordate at base, margin typically entire but varying to

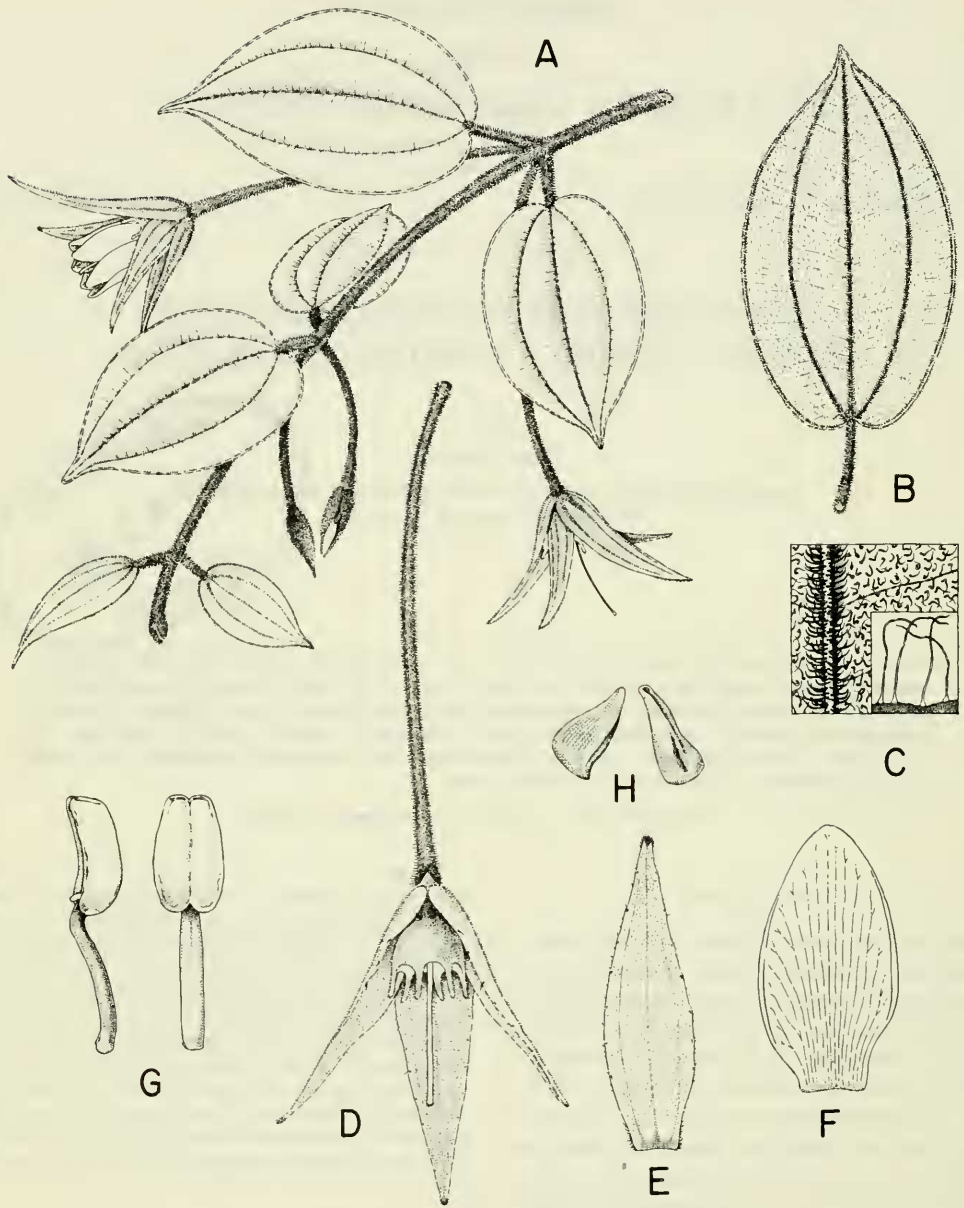


FIGURE 1. *Blakea fuchsoides* Almeda. A, habit,  $\times$  ca.  $\frac{2}{3}$ ; B, representative leaf (lower surface),  $\times$  ca.  $\frac{2}{3}$ ; C, enlargement of lower leaf surface showing pubescence and elevated median nerve; D, representative flower with petals and stamens removed,  $\times$   $\frac{3}{4}$ ; E, outer floral bract (adaxial surface),  $\times$  2; F, petal,  $\times$  4; G, stamens, lateral view (left) and ventral view (right),  $\times$  ca. 15; H, seeds,  $\times$  ca. 15. (A–F from the holotype; G from *Hammel 2261*.)

remotely dentate, 5-nerved below, the outermost pair of subparallel primaries often inconspicuous and concealed by the revolute margins on drying, the transverse secondaries essentially parallel on the upper surface and diverging from the ele-

vated primaries at nearly right angles, moderately to densely strigillose to velutinous above with widely to antrorsely spreading smooth hairs, (0.5–)1–1.5 mm long, but often varying to glabrate at maturity with the pubescence persisting

to varying degrees in the furrows created by the impressed primary nerves, moderately to densely hirsute below with smooth rusty brown hairs 1–2.5 mm long. Flowers 6-merous, pendent, solitary, or rarely geminate in the axils of distal branches; pedicels 3.2–11.5 cm long, densely covered with minutely roughened brown spreading hairs 1 mm long. Floral bracts red, foliaceous, sessile, and entire, moderately to densely covered with roughened spreading hairs 0.5–1 mm long on both surfaces; outer bracts 3–5-nerved, free to the base, 3–4.5 × 1 cm, lanceolate, apex acute, base truncate to rounded; inner bracts 7–14-nerved, free to the base, 2.2–3.5 × 0.9–1.2 cm, lanceolate, apex acute, base truncate to rounded. Hypanthia (at anthesis) campanulate, 5–7 mm long to the torus (vascular ring), moderately to densely strigillose with obscurely roughened hairs 0.5 mm long. Calyx tube ca. 5 mm long, flaring and flangelike; calyx lobes copiously pubescent with minutely roughened brown hairs 0.25–0.5 mm long, deltoid basally between sinuses but abruptly tapered into linear-oblong, mostly entire segments 4–6 mm long and 1 mm wide. Petals glabrous, pink (fide *McPherson 7733*) or magenta (fide *Hammel & Kress 13473*), elliptic-ovate, 19–23 mm long, 14–15 mm wide, connivent and somewhat concave adaxially with slightly involute margins when expanded, apex rounded. Stamens 12, isomorphic, free and forming a pendent circle around the style; filaments complanate, 5–7 mm long; anthers linear-oblong to ovoid-oblong, truncate at apex, 2–3.5 mm long, 2 mm wide, each anther tipped with two confluent pores; connective slightly thickened dorsally and dilated basally about 0.5 mm above base of anther thecae into a bluntly rounded deflexed caudiform appendage about 0.5 mm long. Ovary inferior, 6-celled, glabrous at apex but not expanded into a cone or collar. Style straight, glabrous, 1.8–3.2 cm long, typically exerted beyond the petals and sometimes exceeding the subtending pair of floral bracts; stigma truncate to slightly rounded. Berry globose, about 1 cm long and 1 cm in diameter. Seeds numerous, clavate to narrowly pyriform or bluntly deltoid, 1(–1.5) mm long, beige with a smooth glossy testa and a prominent lateral raphe.

ADDITIONAL SPECIMENS EXAMINED.—PANAMA. Bocas del Toro: along trail on divide separating Chiriquí and Bocas del Toro, ca. 08°45'N, 82°15'W, 22 Oct. 1985, *McPherson 7199* (CAS); Fortuna Dam region along continental divide trail,

08°45'04"N, 82°15'W, 23 Dec. 1986, *McPherson & Aranda 10062* (CAS). Bocas del Toro/Chiriquí Border: above Fortuna Dam, ca. 08°45'N, 82°15'W, 3 Dec. 1985, *McPherson 7733* (CAS). Chiriquí: road to Fortuna Dam site N of Gualaca, 22.7 mi [36.8 km] beyond bridge over Río Esti, 22 Nov. 1979, *Antonio 2770* (CAS); La Fortuna hydroelectric project, on ridge behind camp, 22 Mar. 1978, *Hammel 2261* (MO); trail west from Fortuna Dam camp to La Fortuna, 08°43'N, 82°14'W, 23 Mar. 1985, *Hampshire & Whitefoord 903* (BM); 2 km S of Fortuna Lake, trail east, 08°43'N, 82°14'W, 24 Mar. 1985, *Hampshire & Whitefoord 912* (BM); campamento Bijao en Fortuna, 20 Mar. 1976, *Mendoza et al. 249* (PMA, US); entre alto de Guayabo y la línea divisoria continental, 25 Sep. 1976, *Correa et al. 2837* (PMA, US).

DISTRIBUTION.—Known only from the wet cloud forests of the Fortuna Dam region in western Panama along the Chiriquí/Bocas del Toro border at 1,097–1,400 m.

PHENOLOGY.—Flowering specimens have been collected from August through December; the only available fruiting collection was made in March.

Labels on collections of this species describe it as a climbing or pendent epiphyte. I have not studied this species in the field but its climbing habit, adventitious roots, and pendent inflorescences lead me to suspect that it will ultimately be shown to be a secondary hemiepiphyte like *Miconia arboricola* Almeda (Almeda 1984). Secondary hemiepiphytes are vine-like plants that germinate terrestrially, ascend nearby trees by adventitious roots, and later become epiphytic by losing root contact with the ground (Putz and Holbrook 1986).

In addition to its copious cover of brown smooth hairs on distal branchlets, petioles, lower leaf surfaces, and floral bracts, *B. fuchsoides* is distinguished by an extraordinary combination of floral characters. As emphasized by the specific epithet, the flowers of this species are reminiscent of *Fuchsia* (Onagraceae) in posture and coloration. In *B. fuchsoides* the flowers are borne on flexible pendent pedicels exposing floral organs in a way that favors hovering pollinators. The connivent petals form a broad tube-like conformation, and the floral parts are vividly colored. The hypanthia, calyx lobes, and decussate floral bracts that closely subtend the flowers are bright red, whereas the petals are reportedly pink or magenta.

If future field observations confirm that flowers of this species produce nectar, we can predict that this species is probably bird pollinated be-

cause it exhibits so many of the features associated with ornithophily (Percival 1965; Faegri and van der Pijl 1971; Proctor and Yeo 1973).

This species and other undescribed Central American species currently under study (Almeda, in prep.) exhibit anther characters that weaken the tenuous distinction between *Blakea* and the closely related segregate genus *Topobea*. The traditional differences between these genera are based on anther shape and the relative size and proximity of the apical pores. In *Blakea*, the anthers are oval, oblong, or elliptic and blunt or broadly rounded at the summit with two typically well-separated (often minute) apical pores. In *Topobea*, the anthers are linear-oblong to lanceolate or subulate with the dorsally inclined apical pores approximate and often confluent. Anther size and shape in *B. fuchsoides* agree with the syndrome typically found in *Blakea*. The broad confluent pores, however, dictate assignment of this species to *Topobea*. The truncate position of the anther pores is characteristic of neither genus and underscores the difficulty of assigning unusual new species to either of the genera as they are currently defined. Until a counterargument can be advanced for the continual recognition of *Topobea* based on something other than arbitrary characters, it seems appropriate to follow Baillon (1879) and Macbride (1941) in submerging *Topobea* in the older and much larger genus, *Blakea*.

Because *B. fuchsoides* is one of the most unusual species yet to be described in *Blakea*, it is not surprising that its relationships are obscure. A peculiar feature which has not been reported in other species of *Blakea* or *Topobea* is the delicate, veil-like membrane that covers the broad anther pores prior to anthesis. These veil-like coverings may well function to preclude excessive intrafloral pollen dispersion prior to petal expansion on the pendent flowers.

### *Clidemia hammelii* Almeda, sp. nov.

Figure 2

TYPE.—COSTA RICA. Heredia: Finca La Selva, OTS [Organization for Tropical Studies] Field Station on Río Puerto Viejo just E of its junction with Río Sarapiquí, elev. about 100 m. Slopes along Q. El Salto, 2,900 m S, 2 Sep. 1980, *Hammel 9682* (holotype: CAS!; isotype: DUKE).

Frutex vel arbuscula 1–5 m. Ramuli teretes primum sicut folia novella inflorescentia sparse vel modice setosi pilis 2–3.5 mm longis et modice vel sparse stellulato-furfuracei demum glabrati. Petioli 1–4 cm longi; lamina 11.5–29 × 6.1–14.5 cm

elliptica apice acuminata basi acuta vel cuneata, 5–7-nervata vel 5–7-plinervata, nervi in axillis acarodomatii instructi. Inflorescentia primum terminalis demum lateralis pauciramosa plus minusve deflexa; flores 5-meri, pedicellis (ad anthesim) 1–2.5 mm longis, bracteolis 1.5–2.5 mm longis subulatis persistentibus. Hypanthium (ad torum) 1.5–2.5 mm longum; calyx primum in cono apiculato clausus demum in lobos irregulares persistentes ruptus, dentibus exterioribus 0.5–1 mm eminentibus. Petala 3–3.5 × 1–1.5 mm oblonga-rotundata glabra. Stamina isomorphica vel paulo anisomorphica glabra; filamenta 1.5–2 mm longa; antherarum thecae 1–1.25 × 0.5 vel 1.25–1.75 × 0.5 mm oblongae, poro paulo dorsaliter inclinato; connectivum nec prolongatum nec appendiculatum. Stylus 5–6 mm glaber in ovarii collo 0.5 mm immersus; ovarium 5-loculare omnino inferum apice modice glanduloso-setuloso.

Shrubs or small trees 1–5 m tall. Internodes terete, glabrate at maturity; distal branchlets, vegetative buds, and inflorescences beset with a sparse to moderate covering of smooth, spreading hairs (2–3.5 mm) that is typically intermixed with inconspicuous, early deciduous, asperous-headed hairs and underlain by a moderate to dense understory of stellulate-furfuraceous or short asperous-headed hairs. Leaves of a pair typically somewhat unequal in size; petioles 1–4 cm long; blades membranaceous, 11.5–29 cm long and 6.1–14.5 cm wide, elliptic, apex long-acuminate, base acute to cuneate, margin entire to inconspicuously crenulate, 5–7-nerved or 5–7-plinerved abaxially with pocket domatia typically formed in the angle between the median nerve and each of the two proximal lateral nerves, moderately strigose to subhirsute above with smooth hairs mostly 1–2 mm long, moderately hirsute below with a mixture of smooth hairs (1–2.5 mm long) and minute glandular hairs essentially restricted to the elevated primary and higher order venation. Inflorescence a pseudolateral modified dichasium, 3–6 cm long, divaricately branched from the base; bracts of the rachis nodes paired, narrowly lanceolate to subulate, 3–3.5 mm long, 1 mm wide, sparingly stellulate-furfuraceous to glabrate; bracteoles sessile, persistent, paired but sometimes fused into an inconspicuous nodal collar, narrowly lanceolate to subulate, 1.5–2.5 mm long, up to 0.5 mm wide, essentially glabrous and entire but terminating in a solitary hair. Pedicels 1–2.5 mm long, sparingly to moderately stellulate-furfuraceous and basally encircled by a deciduous, tufted ring of barbellate or asperous-headed hairs. Hypanthia (at anthesis) campanulate, 1.5–2.5 mm long to the torus (vascular ring), moderately to sparsely covered with spreading smooth hairs 0.5–2 mm

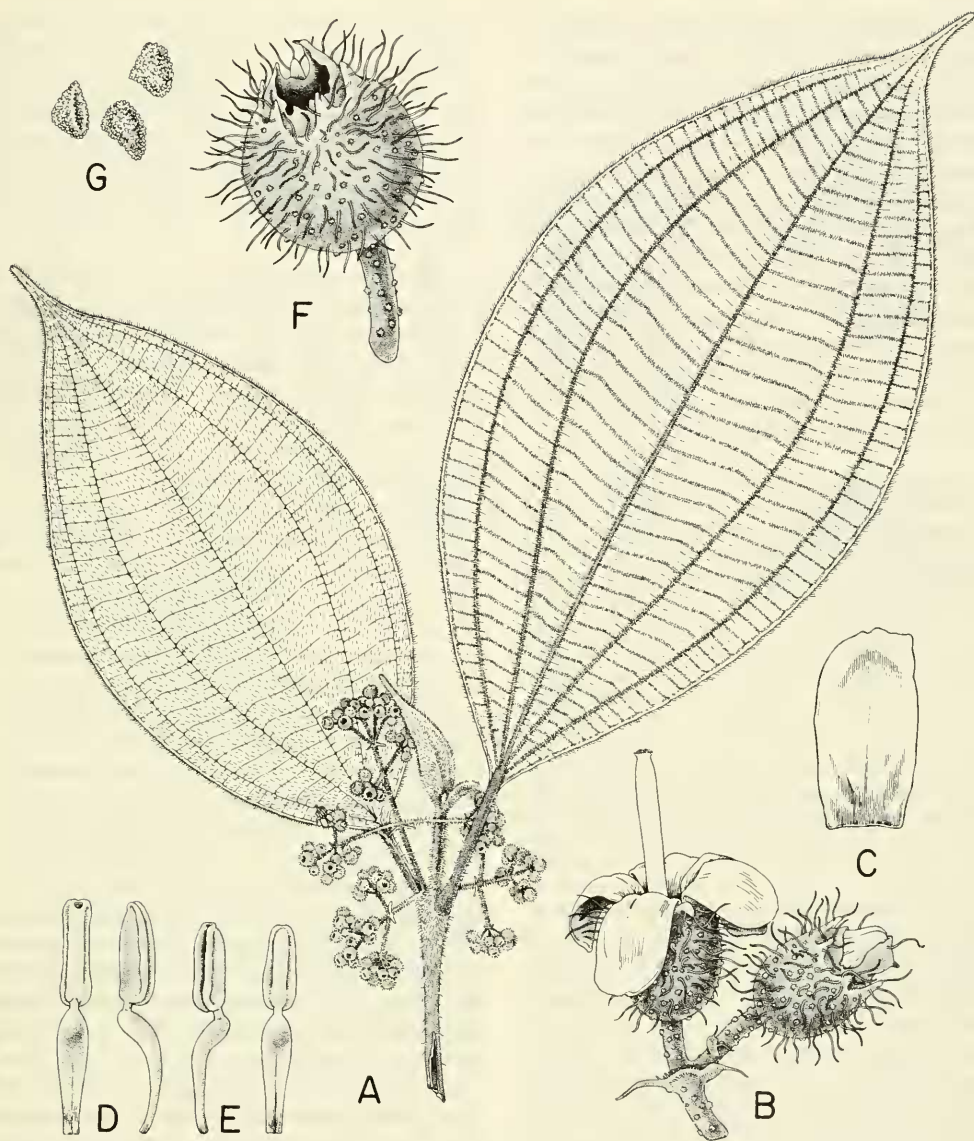


FIGURE 2. *Clidemia hammelii* Almeda. A, habit,  $\times \frac{3}{4}$ ; B, representative flower with stamens removed (left) and floral bud showing rupturing calyx (right),  $\times 9$ ; C, petal,  $\times 10$ ; D, larger (antepetalous) stamens, dorsal view (left) and  $\frac{3}{4}$  lateral view (right),  $\times$  ca. 10; E, smaller (antesepalous) stamens,  $\frac{3}{4}$  lateral view (left) and dorsal view (right),  $\times$  ca. 12; F, mature berry,  $\times 3$ ; G, seeds,  $\times 16$ . (A from Folsom 5864; B-E from de Nevers 3962; F, G from Hammel 12668.)

long and a sparse understory of sessile stellate-furfuraceous hairs. Calyx closed in bud and crowned by an apiculum 0.5 mm long but rupturing irregularly at anthesis into 3–5 hyaline, persistent, rounded lobes 0.5 mm long; calyx teeth 5, subulate, 0.5–1 mm long. Petals 5, glabrous and reflexed, white or reportedly pale pink, oblong, rounded and often bluntly erose apically,

otherwise entire, 3–3.5 mm long, 1–1.5 mm wide. Stamens 10, isomorphic or alternately subisomorphic with larger stamens inserted on glabrous torus opposite petals and smaller stamens inserted opposite calyx lobes; filaments glabrous, complanate and constricted distally, 1.5–2 mm long; anthers 1–1.5 (–1.75) mm long and 0.5 mm wide, yellow, linear-oblong, deeply channeled

ventrally between thecae, truncate to slightly emarginate distally with a circular, somewhat dorsally inclined pore; connective simple, slightly thickened dorsally but not dilated or prolonged below thecae. Ovary inferior, 5-celled, fluted and distended apically into a glandular-puberulent, lobulate, stylar collar mostly 0.5 mm high that becomes depressed and bowl-like on maturing berries. Style straight, glabrous, 5–6 mm long; stigma truncate. Berry reportedly dark purple at maturity, globose, 6–7 mm long and 5–6 mm in diameter. Seeds numerous, galeiform to deltoid, 0.5 mm long, white or beige, irregularly angulate with a densely papillate testa and a lateral flattened or somewhat convex raphe.

ADDITIONAL SPECIMENS EXAMINED.—COSTA RICA. Cartago: Valle Escondido, 30 Mar. 1966, *Schnell 627* (US). Heredia: Finca La Selva. OTS Field Station on Río Puerto Viejo, just E of its junction with Río Sarapiquí, 21 Jul. 1981, *Hammel 11026* (DUKE); forest N of road to Puerto Viejo at Chilamate, 22 May 1982, *Hammel 12423* (CAS, CR); hills near Chilamate along road between Puerto Viejo and La Virgen, 30 May 1982, *Hammel 12668* (CAS); Chilamate de Sarapiquí, S end of Cerros Sardinal, N side of Río Sarapiquí, 10°27.5'N, 84°4'W, 3 Jul. 1985, *Hammel & Grayum 14103* (CAS); Finca El Bejuco, S base of Cerros Sardinal, Chilamate de Sarapiquí, 10°27'N, 84°04'W, 2 Jun. 1985, *Grayum & Jacobs 5355* (CAS); between Río Peje and Río Sardinalito, Atlantic slope of Volcan Barva, 10°18.5'N, 84°04'W, 8 Apr. 1986, *Grayum 6910* (CAS—2 sheets); Tirimbina, 9 Jun. 1971, *Proctor 32244* (MO). PANAMA. Bocas del Toro: between Fortuna and Chiriquí Grande, 8.5 mi [13.7 km] N of bridge over the Fortuna Lake, 08°46'N, 82°14'W, 10 Mar. 1985, *Croat 60151* (CAS); Fortuna to Chiriquí, ca. 3 km N of continental divide, 08°48'N, 82°11'W, 12 Feb. 1986, *Hammel & McPherson 14466* (CAS); Fortuna Dam region, near Chiriquí Grande, 08°45'N, 82°15'W, 18 Jan. 1986, *McPherson 8079* (CAS); 8.5 road-miles [13.7 km] from bridge near Fortuna Dam on road towards Chiriquí Grande, 08°50'N, 82°15'W, 10 Mar. 1985, *McPherson 6760* (CAS); road to Chiriquí Grande, 6 km N of continental divide, 08°50'N, 82°07'W, 2 Aug. 1984, *Todzia et al. 2558* (CAS); Fortuna Dam area to Chiriquí Grande, 2 Aug. 1984, *D'Arcy et al. 15996* (CAS); above Chiriquí Grande ca. 2 mi E on a side road ca. 10 road-miles below continental divide, 08°55'N, 82°10'W, 11 Mar. 1988, *Almeda et al. 6082* (CAS, MO, PMA, US). Coclé: 2 mi N of Cerro Pilon, 16 Mar. 1973, *Liesner 726* (CAS, MO); between La Junta and Limón, 5 hour walk N of Alto Calvario, 11 Oct. 1977, *Folsom 5864* (CAS); Caribbean side of divide at El Cope, 08°45'N, 80°35'W, 4 Feb. 1983, *Hamilton & Davidse 2776* (CAS); road from La Pintada to Coclesito, 08°45'N, 80°30'W, 7 Feb. 1983, *Hamilton & Davidse 2815* (CAS). Colón: 9 mi [14.6 km] S of Portobello, 17 Jul. 1970, *Croat 11372* (F, US); Río Iguanita and inland to 2 km, 7 Feb. 1981, *D'Arcy 14615* (CAS). Darién: vicinity of gold mining camp of T. Kitredge on headwaters of Río Tuquesa ca. 2 air km from continental divide, 26 Aug. 1974, *Croat 27210* (F); forested ridges and valleys at Mamey, 6 Mar. 1982, *Whitefoord & Eddy 374* (BM, MO). Panamá: 13 km N of El Llano on road to Cartí, 13 Feb. 1973, *Busey 374* (US); El Llano—Cartí road, 14.8 km N of Panamanian Hwy., 27 Jan. 1977, *Folsom et al. 1479*

(MO). San Blas: Nusagandi, trail from camp NW to a quebrada, 09°19'N, 78°15'W, 31 Jul. 1984, *de Nevers & de Leon 3595* (CAS); Nusagandi, El Llano—Cartí road, 09°19'N, 78°15'W, 10 Aug. 1984, *de Nevers & Gonzalez 3655* (CAS); Llano—Cartí road, 19 km from Interamerican Hwy., 09°19'N, 78°55'W, 4 Sep. 1984, *de Nevers & Herman 3831* (CAS); Llano—Cartí road, 20 km from Interamerican Hwy., 09°19'N, 78°55'W, 30 Sep. 1984, *de Nevers et al. 3962* (CAS). COLOMBIA. Chocó: forest NW of Alto Curiche, 20 May 1967, *Duke & Idrobo 11240* (US).

DISTRIBUTION.—Currently known from river banks, shaded sites, and light gaps in rain forests from the Puerto Viejo region of northeastern Costa Rica south through Panama to an area northwest of Alto Curiche in western Colombia, from sea level to 900 m.

PHENOLOGY.—Flowering and fruiting occur sporadically throughout the year.

Although variable in foliar size and the degree to which the elevated primaries diverge from the median nerve on lower foliar surfaces, *C. hammelii* is readily defined by the following set of characters: a divaricately branched pseudolateral inflorescence; an irregularly rupturing apiculate calyx; a fluted, glandular-puberulent stylar collar; and seeds that are galeiform to angularly deltoid in outline with a densely papillate testa. There also appears to be some intrafloral variation in staminal size among the three flowering collections available for study. A collection from Panama (*de Nevers et al. 3962*) has stamens that are alternately somewhat unequal in size (see Fig. 2), whereas *Hammel 9682* from Costa Rica and *Todzia et al. 2558* from Panama have stamens that are clearly isomorphic. This slight variation may prove to be taxonomically inconsequential but warrants further observation as additional flowering collections are made.

Although *C. hammelii* appears to have no close allies among described congeners, it bears a superficial vegetative resemblance to *C. reitziana* Cogn. & Gleason and *C. costaricensis* Cogn. & Gleason. Both differ from *C. hammelii* in having an adaxially pubescent torus, regularly developed (nonrupturing) calyx lobes, and smooth seeds.

A distinctive, but not always conspicuous, feature of *C. hammelii* is the occurrence of small funnel-shaped pockets or chambers in the angles between the median nerve and the base of each proximal lateral nerve (see Fig. 3). The function of these structures in any kind of symbiotic relationship is unclear. Of the numerous collections cited above, label information on only one

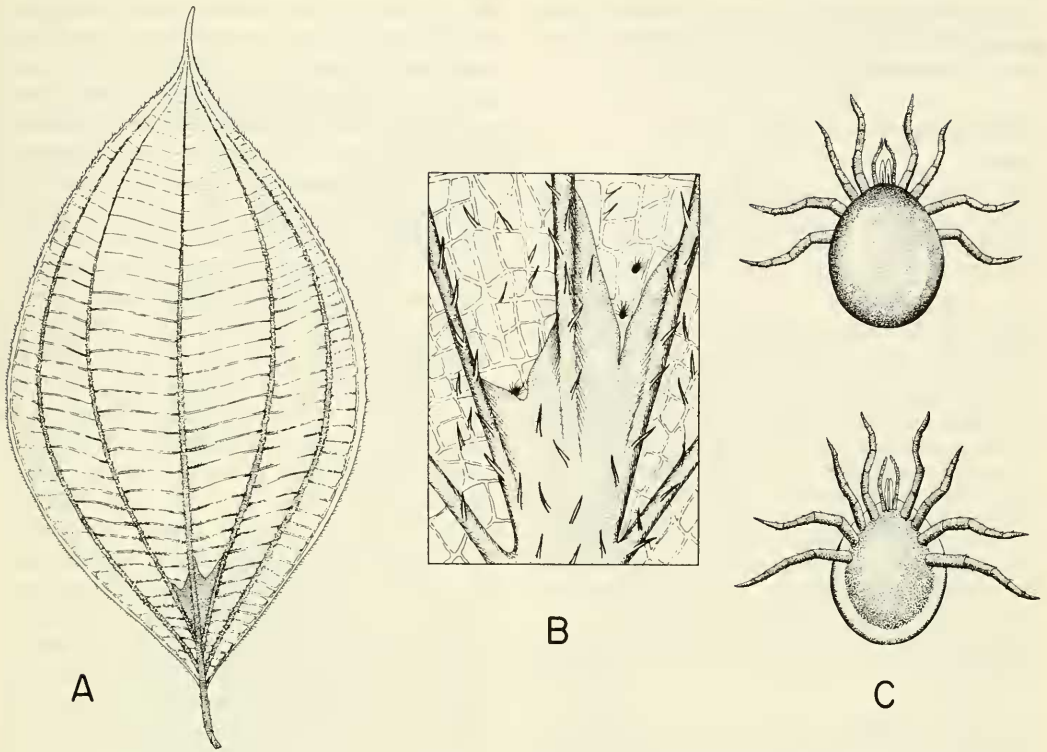


FIGURE 3. *Clidemia hammelii* Almeda. A, representative leaf (abaxial surface),  $\times$  ca.  $\frac{1}{4}$ ; B, enlargement of lower leaf surface showing pocket domatia,  $\times$  ca. 5; C, the mite, *Ololaelaps* sp., dorsal view (above) and ventral view (below),  $\times$  ca. 20. (A, B from Almeda *et al.* 6082.)

from Panama (*de Nevers & Herman 3831*) makes note of "ants in the leaves." During recent field work I examined several individuals of another Panamanian population (Almeda *et al.* 6082) and found mites of the genus *Ololaelaps* (Gamasida, family Laelapidae) in the domatia of at least three individuals (see Fig. 3). No other insects or arthropods, however, were encountered in the 33 domatia examined. According to G. W. Krantz (in litt., 16 June 1988) a domatium is an odd habitat for *Ololaelaps* because most are described from moss and litter substrates, or from the nests of small mammals. Because mites of this genus are thought to be predaceous, Krantz suggests that the mites may feed on resident nematodes, or they may simply use the domatia as shelters.

In his review of plant domatia, Jacobs (1966) concludes that there is no evidence to demonstrate a biological relationship between domatia-bearing plants and mites. Benson (1985), however, notes that scavenging mites are fairly

common opportunistic invaders of plant cavities. He suggests that pocket domatia, often referred to as acarodomatia, probably function as feeding sites for sucking homopterans (i.e., the coccids or scale insects, and the membracids or treehoppers). This ant-coccid linkage is intriguing when one considers that homopterans can attract ants with their honeydew secretions and gain protection from other predaceous insects. Charles Turner (pers. comm., 26 May 1988), who is currently working on mite ecology, proposes a facultative mutualistic interaction to explain the plant-mite association. He suggests that the pocket domatia may serve as egg nurseries and help to shelter the mites from predators. The mites, in turn, benefit the plant by feeding on fungal spores and the eggs of predaceous insects. The plant-mite relationship thus remains unsolved, requiring more sophisticated field-oriented study than it has received so far.

This species is named for Barry E. Hammel, a student of neotropical Clusiaceae whose col-

lecting efforts in Costa Rica and Panama have added many new and interesting plants to the flora of Mesoamerica.

***Miconia calocoma* Almeda, sp. nov.**

Figure 4

TYPE.—COSTA RICA. Heredia: Finca La Selva, OTS Field Station on Río Puerto Viejo just E of its junction with Río Sarapiquí, southeast corner, elev. 100 m, 17 Apr. 1981, *Folsom 9776* (holotype: CAS!; isotype: DUKE).

Frutex vel arbuscula 3–5 m. Ramuli teretes sicut petioli foliorum subtus venae primariae inflorescentia hypanthiaque modice pilis stellatis induti. Petioli 4–10 mm longi; lamina (4.2–)8.5–19.5 × (2.3–)5–8.5 cm elliptica vel ovato-elliptica apice acuminata basi rotundato-obtusa, 5(–7)-plinervata, membranacea et undulata vel undulato-dentata. Inflorescentia 3–7 cm longa multiflora; flores 4-meri, pedicellis (ad anthesim) 0.5 mm longis, bracteolis 2–3 mm longis anguste oblongis persistentibus. Hypanthium (ad torum) 2 mm longum; calyx primum in cono apiculato clausus demum in lobos regulares persistentes ruptus, dentibus exterioribus 1–1.5 mm eminentibus. Petala 3–4 × 1.5–2.5 mm obovato-oblonga glabra. Stamina isomorphica glabra; filamenta 1.5–2 mm longa; antherarum thecae 1–1.5 × 0.5 mm angustae oblongae, poro paulo ventraliter inclinato; connectivum nec prolongatum nec appendiculatum. Stylus 5–10 mm glaber; ovarium 4-loculare et  $\frac{3}{4}$  inferum glaber.

Shrubs or small trees 3–5 m tall. Older cauline internodes terete and essentially glabrous. Distal branchlets, petioles, and inflorescences densely covered with a mixture of rusty brown sessile-stellate and stipitate-stellate hairs. Leaves of a pair typically unequal in size; petioles 4–10 mm long; blades membranaceous, (4.2–)8.5–19.5 cm long and (2.3–)5–8.5 cm wide, elliptic to elliptic-ovate, apex acuminate, base typically obtuse to broadly rounded but sometimes varying to slightly oblique at base and then somewhat decurrent on petiole, margin undulate to undulate-dentate; 5(–7)-plinerved with the inner pairs of subparallel primary nerves elevated and diverging from median nerve in opposite, subopposite, or irregularly alternate fashion at successive points above the blade base, sparingly stellate pubescent to glabrous above at maturity, copiously stellate pubescent on elevated primary nerves below with a sparser hair covering on prominulous network of transverse secondary and higher order veins. Inflorescence terminal but sometimes appearing pseudolateral because of elongation of axillary shoots, paniculiform with ultimate branchlets terminating in multiflowered, congested glomerules; bracts of rachis nodes paired, linear-oblong, 2–5 mm long, 0.5–1 mm wide, glabrous above and copiously stellate below; bracteoles persis-

tent, 2–3 per pedicel, sessile, linear-oblong, attenuate apically, 0.5–1.5 mm long, 0.25–0.5 mm wide, margin entire with a solitary apical hair, glabrous above and sparingly to moderately stellate below. Pedicels copiously stellate pubescent, 0.5 mm long but inconspicuous and concealed by congested glomerules. Hypanthia (at anthesis) campanulate, 2 mm long to the torus (vascular ring), densely stellate pubescent throughout. Calyx closed in bud and crowned by an apiculum 0.25 mm long but rupturing at anthesis into 2–4 persistent deltoid to semicircular hyaline lobes mostly 1 mm long and 1–1.5 mm wide basally; exterior calyx teeth 4, linear-oblong, 1–1.5 × 0.5 mm, copiously stellate and widely spreading to recurved on fruiting hypanthia. Petals 4, glabrous, white, obovate to oblong-obovate, widely spreading to reflexed, rounded apically, 3–4 mm long and 1.5–2.5 mm wide distally. Stamens 8, isomorphic; filaments glabrous, complanate, constricted and incurved distally, 1.5–2 mm long; anthers 1–1.5 mm long and 0.5 mm wide, yellow, linear-oblong, laterally compressed and deeply channeled ventrally between thecae, truncate to slightly emarginate distally with a somewhat ventrally inclined terminal pore; connective thickened dorsally but not dilated or prolonged below the filament insertion. Ovary ca.  $\frac{3}{4}$  inferior, 4-celled, and glabrous. Style erect, often somewhat curved distally, glabrous, 5–10 mm long and conspicuously overtopping the surrounding stamens; stigma truncate to capitellate. Berry reportedly blue-black to purple at maturity, globose, 6–8 mm long and 6–8 mm in diameter. Seeds numerous, obovoid to pyriform, 1 mm long, white or beige, somewhat angulate with a densely tuberculate testa and a lateral flattened raphe on the opposing face.

ADDITIONAL SPECIMENS EXAMINED.—COSTA RICA. Heredia: S of Puerto Viejo, 2 km S of Magsasay Penal Colony, W of road, 5 Feb. 1983, *Garwood et al. 1125* (BM, MO); Finca La Selva, OTS Field Station on Río Puerto Viejo, just E of its junction with Río Sarapiquí, 3,000 m line, South Boundary along Central Trail, 2 May 1981, *Folsom 9990* (CAS); Finca La Selva, OTS Field Station, South Boundary, 1,900 m E, 6 Aug. 1980, *Hammel 9452* (DUKE); Finca La Selva, OTS Field Station, South Boundary, 1,600 m E, 27 Sep. 1980, *Hammel 9872* (DUKE); Finca La Selva, OTS Field Station, South Boundary on slope just W of Q. Esquina, 15 Jul. 1982, *Hammel & Trainer 13181* (CAS). Limón: Cerro Coronel, E of Laguna Danto, 10°41'N, 83°38'W, 16–23 Jan. 1986, *Stevens 23730* (MO).

DISTRIBUTION.—A little-collected rain forest species currently known from northeastern Costa





FIGURE 4. *Miconia calocoma* Almeda. A, habit,  $\times \frac{3}{4}$ ; B, representative leaf (lower surface),  $\times \frac{3}{4}$ ; C, enlargement of lower leaf surface showing stellate pubescence; D, representative flower,  $\times 12$ ; E, petal,  $\times 10$ ; F, stamens,  $\frac{1}{4}$  lateral view (left) and ventral view (right),  $\times 10$ ; G, mature berry,  $\times 4$ ; H, seeds,  $\times 15$ . (A–F from the holotype; G, H from Hammel 13181.)

Rica in an area extending from Cerro Coronel just south of Barra del Colorado southwest to the OTS La Selva Field Station and vicinity at 20–200 m.

**PHENOLOGY.**—Flowering and fruiting specimens have been collected from January through May and July through September, respectively.

*Miconia calocoma* is distinguished by its rusty stellate pubescence, 4-merous flowers, irregular-

ly rupturing apiculate calyx, unappendaged anthers, 4-celled ovary, and densely tuberculate, obovoid to pyriform seeds.

Placement of this species into Cogniaux's (1891) sectional classification depends on whether one chooses to emphasize characters of the calyx or stamens. In having oblong unappendaged stamens with ventrally inclined apical pores, *M. calocoma* would appear to belong to

section *Amblyarrhena*. Within this section, however, no particular species or group of species can be singled out as close relatives. The irregularly rupturing apiculate calyx is characteristic of section *Laceraria*, but *M. calocoma* lacks the dorsally appendiculate anthers that are typical of that section. Within this latter section, *M. calocoma* is most similar to *M. rapticalyx* Wurdack of Venezuela and *M. wagneri* Macbride of Bolivia and Peru. These two allopatric taxa share several diagnostic features with *M. calocoma* including the stellate pubescence, rupturing apiculate calyx, and 4-merous flowers. Characters that consistently separate *M. rapticalyx* from *M. calocoma* include the larger (12–28 × 9–19 cm) ovate, 5–7-nerved leaves with rounded serrulate margins, reniform bracteoles, dorsally inclined anther pores, and 2(–3)-celled ovary. *Miconia wagneri* is readily separated from *M. calocoma* by many of these same features but it differs most notably in having larger (15–25 × 8–12 cm), 5–7-nerved leaves that are entire or remotely callose-denticulate and anther connectives that are dilated at the filament insertion into dorso-basal spurs.

The epithet for this species is derived from the Greek word *kalos*, beautiful, and the Latin word *coma* (*kome* in Greek), hair tuft, in reference to the attractive covering of rusty stellate hairs on branchlets, leaves, and inflorescences.

### *Miconia dissitiflora* Almeda, sp. nov.

Figure 5

TYPE.—COSTA RICA. Puntarenas: above Golfito along road to television tower, elev. 50–500 m, 16 Jul. 1977. *Almeda et al.* 3093 (holotype: CAS!; isotypes: BM!, BR!, CR!, DUKE!, F!, MO!, NY!, US!).

Frutex 1–3 m. Ramuli teretes sicut foliorum subtus venae primariae inflorescentia hypanthiaque sparse vel modice glanduloso-furfuracei. Folia subsessilia vel petiolis 1–5(–9) mm longis; lamina 6.5–22 × 3.1–10 cm, elliptica vel elliptico-ovata apice acuminata vel attenuata basi paulo cordata vel rotundata, 5(–7)-plinervata, membranacea et undulata vel subintegra. Inflorescentia 7–20.5 cm longa multiflora; flores 5-meri, pedicellis (ad anthesim) 1.5–2.5 mm longis; bracteolis 0.5 mm longis subulatis. Hypanthium (ad torum) 1.5 mm longum; calyx primum in cono apiculato clausus demum in lobos irregulares persistentes ruptus, dentibus exterioribus 0.5 mm eminentibus. Petala 3.5 × 1.5–2 mm oblongo-lanceolata glabra. Stamina paulo anisomorpha glabra; filamenta 1.5–2 mm longa; antherarum thecae 2 × 0.5 vel 1.5 × 0.5 mm angustae oblongae, poro paulo dorsaliter inclinato; connectivum nec prolongatum nec appendiculatum. Stylus 2.5–3 mm glaber; ovarium 5-loculare omnino inferum apice modice puberulo.

Sparingly branched shrubs 1–3 m tall. Older

cauline internodes terete and glabrous. Distal branchlets and inflorescences moderately to sparingly stellate-furfuraceous. Leaves of a pair somewhat unequal in size, typically subsessile and clasping or sometimes with petioles 1–5(–9) mm long; blades membranaceous to subcoriaceous at maturity, 6.5–22 cm long and 3.1–10 cm wide, elliptic to elliptic-ovate, apex acuminate to attenuate, base rounded to subcordate but sometimes varying to slightly oblique, margin bluntly undulate-dentate to subentire, 5(–7)-plinerved below with inner pairs of subparallel primary nerves elevated and diverging from median nerve in opposite fashion at successive points above blade base, glabrous above, glabrous to sparingly stellate on and adjacent to elevated primaries below. Inflorescence a terminal, divaricately branched paniculiform dichasium 7–20.5 × 7–30 cm; bracts of the rachis nodes paired, lance-triangular, 0.5–4 mm long, 0.5–1 mm wide, essentially glabrous throughout or sparingly stellate pubescent below; bracteoles paired, glabrous, sessile and evidently fused into a short nodal collar usually evident as an elevated interpetiolar ridge, lance-triangular to subulate, 0.5 mm long, 0.5 mm wide at base, margin entire. Pedicels sparingly stellate-furfuraceous to glabrous, 1.5–2.5 mm long. Hypanthia (at anthesis) campanulate, 1.5 mm long to torus (vascular ring), glabrous to sparingly stellulate puberulent basally. Calyx closed in bud and crowned by an apiculum ca. 0.5 mm long but rupturing irregularly at anthesis into 2–5 persistent hyaline lobes 1–1.5 mm long; exterior calyx teeth 5, subulate, 0.5 mm long, glabrous, erect to antrorsely spreading. Petals 5, glabrous, white, oblong-lanceolate, acute to retuse apically, 3.5 mm long and 1.5–2 mm wide, margin entire. Stamens 10, alternately unequal with the larger stamens inserted on the torus opposite the petals and the smaller ones inserted opposite the calyx lobes; filaments glabrous, complanate, somewhat constricted and geniculate distally, 1.5–2 mm long; anthers 1.5–2 mm long and 0.5 mm wide, yellow, linear-oblong, truncate distally with a somewhat dorsally inclined terminal pore; connective slightly thickened dorsally but not dilated or prolonged below the filament insertion. Ovary inferior, 5-celled, minutely and caducously puberulent at the summit. Style straight, glabrous, 2.5–3 mm long; stigma truncate. Berry globose, 2.5–3.5 mm long and ca. 2.5 mm in diameter. Seeds numerous, white, galeiform, 0.5 mm long with

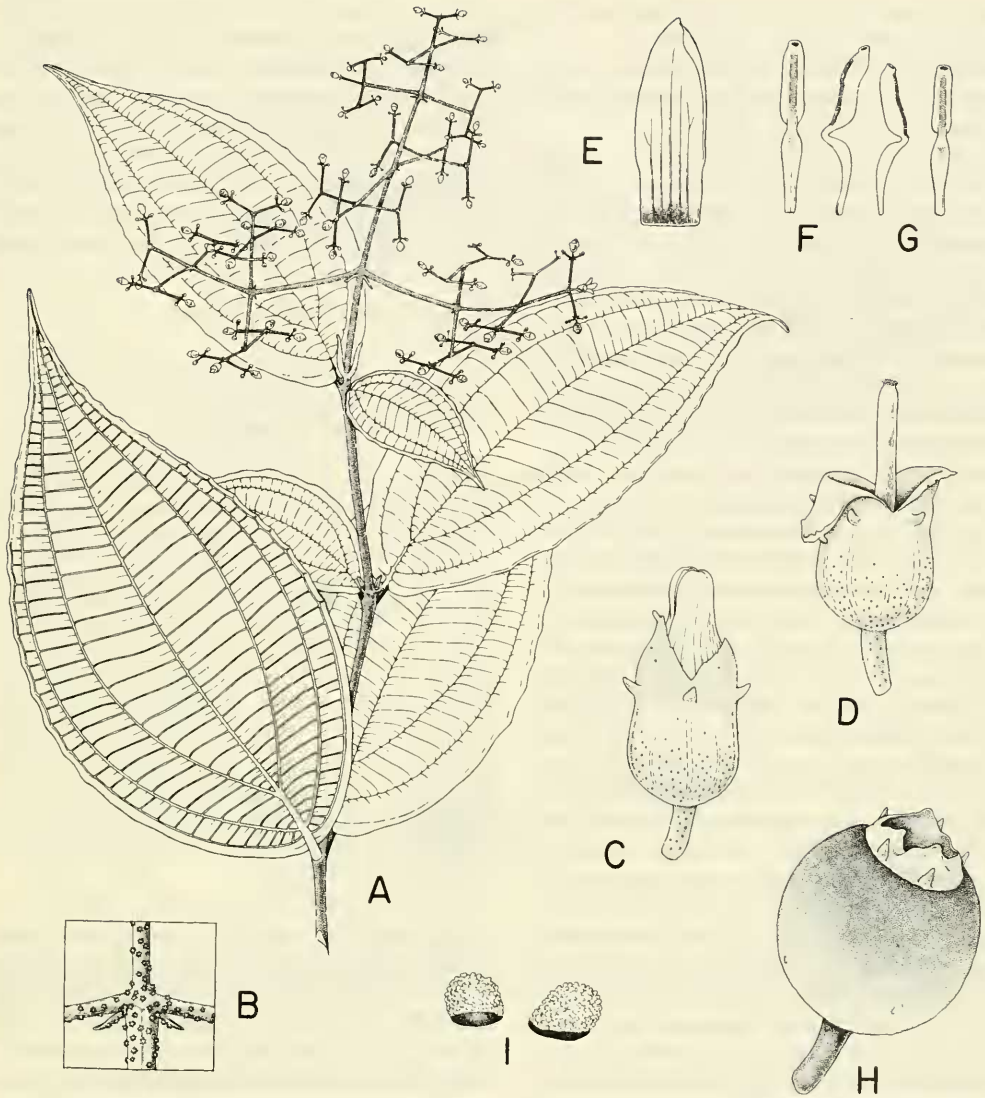


FIGURE 5. *Miconia dissitiflora* Almeda. A, habit,  $\times \frac{2}{3}$ ; B, enlargement of inflorescence node showing bracts and stellate-furfuraceous pubescence; C, floral bud showing rupturing calyx and apiculum,  $\times 12$ ; E, petal,  $\times 9$ ; F, larger (antepetalous) stamens, dorsal view (left) and lateral view (right),  $\times 6$ ; G, smaller (antesealous) stamens, lateral view (left) and dorsal view (right),  $\times ca. 6$ ; H, mature berry,  $\times ca. 10$ ; I, seeds,  $\times ca. 18$ . (A–G from the holotype; H, I from *Liesner 2013*.)

a densely muricate or verrucose testa on the convex side and a lateral raphe on the opposing face.

**ADDITIONAL SPECIMENS EXAMINED.**—COSTA RICA. Puntarenas: main ridge and NE slopes of Fila de Cal, between San Vito and Ciudad Neily,  $08^{\circ}41'N$ ,  $82^{\circ}56.5'W$ , 13 Sep. 1985, *Grayum et al. 6034* (CAS); NE slopes of Fila de Cal between San Vito and Ciudad Neily,  $08^{\circ}41'N$ ,  $82^{\circ}56.5'W$ , 12 Jul. 1985, *Hammel & Grayum 14187* (CAS); Rincón de Osa, Río Agua

Buena to ca. 4 km above it, 10 Feb. 1974, *Liesner 2013* (CAS); Corcovado National Park, trail from base of hills to Los Chiles, 9 Jul. 1977, *Liesner 3071* (CAS, CR); trail from radio tower on ridge above Golfito, opposite docks,  $08^{\circ}39'N$ ,  $83^{\circ}10'W$ , 25 Jul. 1977, *Webster 22045* (CAS).

**DISTRIBUTION.**—Known only from the Golfo Dulce region of southern Costa Rica in an area extending from Los Chiles in Corcovado Na-

tional Park eastward to Fila de Cal between San Vito and Ciudad Neily at 20–620 m.

**PHENOLOGY.**—Flowering specimens have been collected in July and September; the only fruiting specimen was collected in July.

*Miconia dissitiflora* is a well-defined species, readily distinguished by its sparse stellate-furfuraceous indument, divaricately branched inflorescence, irregularly rupturing calyx, unappendaged anisomorphic stamens, and oblong-lanceolate petals. It is also unusual and evidently unique among New World berry-fruited melastomes in having the larger stamens inserted on the torus opposite the petals. Among neotropical melastomes this condition is known only in the capsular-fruited genus *Monochaetum*.

The problem of placing *M. dissitiflora* into a section parallels the ambiguous situation described above for *M. calocoma*. An emphasis on staminal characters would dictate placement into section *Amblyarrhena*, whereas characters of the calyx suggest a relationship with the species of section *Laceraria*. The new species bears no strong resemblance to any of the described taxa currently placed in section *Amblyarrhena*. A search for morphologically similar species in section *Laceraria* has only served to highlight the ambiguities involved when assessing relationships based on different character sets. *Miconia centrodesma* of section *Laceraria* shares an irregularly rupturing calyx and a sparse stellate-furfuraceous indument with *M. dissitiflora*, but it differs in a number of diagnostic reproductive characters. It has 4-merous flowers, isomorphic stamens, dorsally appendiculate anthers, a 2–3-celled ovary, and narrow angular-oblong tuberculate seeds. The seeds of *M. centrodesma* are unusual in having a dilated testa at the distal end that forms a foot or spur composed of enlarged cells that collapse on drying. This “foot,” which can be observed only in fresh or hydrated material, imparts an overall shape reminiscent of a miniature boomerang. Thus, the seeds of *M. centrodesma* differ dramatically from the muricate or verrucose galeiform seeds of *M. dissitiflora*. These considerable differences suggest that the relationship between *M. centrodesma* and *M. dissitiflora* is not a particularly close one. Consequently, *M. dissitiflora* is probably best regarded as an isolated species not readily placed within the sectional classification proposed by Cogniaux (1891).

The epithet chosen for this species is derived from the Latin word *dissitus*, remote or lying

apart, referring to the well-spaced position of flowers on the divaricately branched inflorescence. It is this character, together with the small apiculate buds and plinerved leaves, that give *M. dissitiflora* an aspect reminiscent of *Conostegia cinnamomea* (Beurl.) Wurdack. The latter differs in having isomorphic stamens, a calyptriform, circumscissile calyx, and oblong, deltoid seeds that are somewhat angulate on the convex face.

### *Tococa croatii* Almeda, sp. nov.

Figure 6

**TYPE.**—PANAMA. Darién: Serranía de Pirre, 9–10 km due N of Alto de Nique, elev. 1,520–1,560 m, 27 Jul. 1976, Croat 37873 (holotype: CAS; isotype: MO!).

Frutex 0.5–1.5 m. Ramuli primum rotundato-quadrangulati demum teretes sicut foliorum venae primariae et secundariae sparse vel modice setosi pilis laevibus laxis paulo retrorsis 0.5–2 mm longis. Petioli 2.5–12.5 cm longi; lamina 12–19.5 × 8.3–15.3 cm ovata apice acuminata basi rotundata vel cordata, 7(–9)-nervata, membranacea et crenulata ciliata. Inflorescentia 10–18 cm long multiflora; flores 5-meri, pedicellis (ad anthesis) 1–4 mm longis, bracteolis 1 mm longis subulatis persistentibus. Hypanthium (ad torum) 2–2.5 mm longum; calyx primum in cono apiculato clausus demum in lobos regulares persistentes ruptus, dentibus exterioribus 0.25–0.5 mm eminentibus. Petala 5–6 × 3.5–5 mm obovata glabra. Stamina isomorphica glabra; filamenta 2.5–3.5 mm longa; antherarum thecae 1.5–2 × 1 mm oblongae inter se cohaerentes poro 0.5 mm diam.; connectivum dorsaliter ad basim dente ca. 1–1.5 mm longo descendenti armatum. Stylus 5.5–8.5 mm; ovarium 5-loculare omnino inferum apice sparsissime pilis 0.5–1 mm longis glandulosus armato.

Shrubs 0.5–1.5 m tall. Distal branchlets subquadrangular, sparsely to moderately beset with a caducous cover of straight spreading and/or somewhat crisped hairs mostly 1–2 mm long. Leaves of a pair equal to slightly unequal in size; petioles 2.5–12.5 cm long; blades thin and membranaceous, 12–19.5 cm long and 8.3–15.3 cm wide, broadly ovate to cordate, apex acuminate, base broadly rounded to cordate, margin ciliate-crenulate, 7(–9)-nerved below with all primary nerves diverging from a common point at base of blade, sparingly to moderately setulose above with smooth appressed to somewhat spreading hairs mostly 0.5–2 mm long, moderately fine setulose on and between primary nerves below with tardily caducous, simple, and glandular hairs 0.5–1 mm long. Inflorescence a terminal multiflowered panicle 10–18 cm long with subverticillate branching at secondary nodes; rachis moderately to copiously covered with spreading glandular hairs (0.5–1 mm long) and a ground layer of sessile glandular hairs; bracts of rachis nodes paired, linear-oblong, 2.5–3 mm long, 0.5 mm

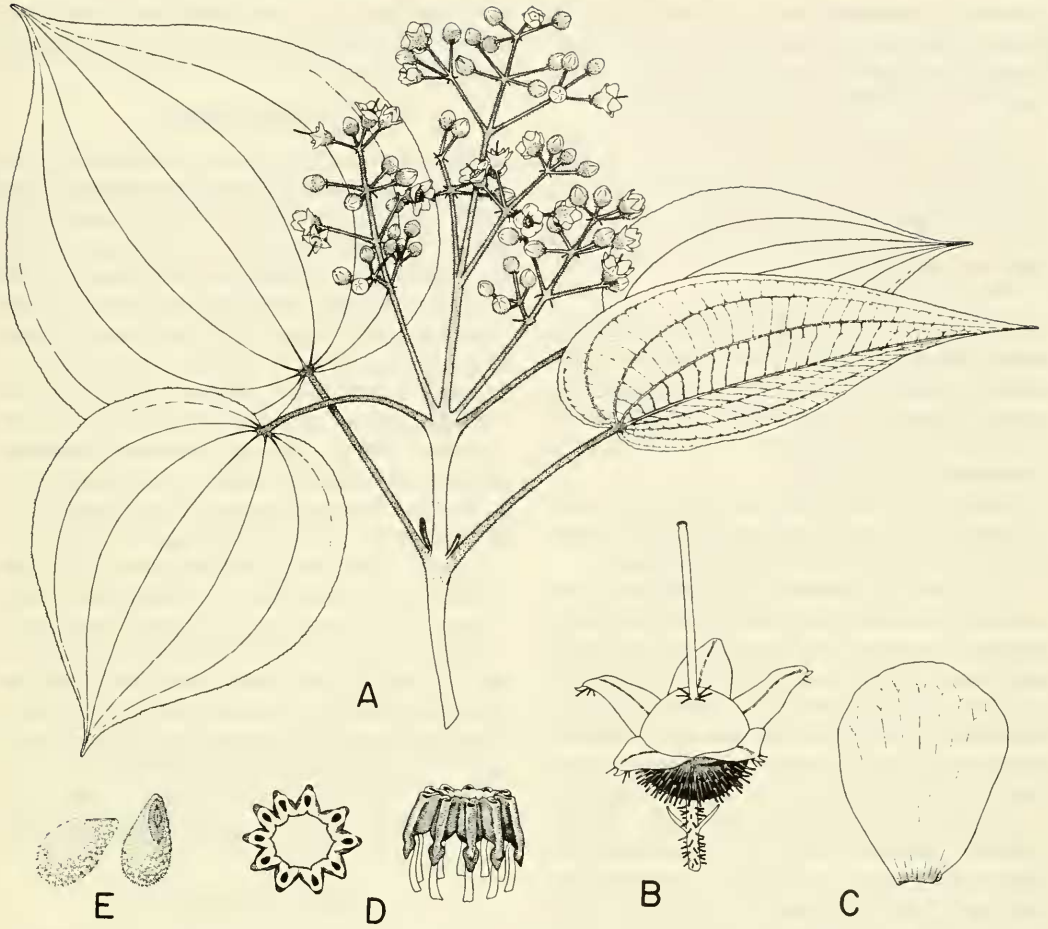


FIGURE 6. *Tococa croatii* Almeda. A, habit,  $\times 1/2$ ; B, flower with petals and staminal ring removed,  $\times 4$ ; C, petal,  $\times 5$ ; D, staminal ring as seen from above (left) and lateral view (right),  $\times ca. 4$ ; E, seeds,  $\times ca. 25$ . (A–D from the holotype; E from Gentry & Mori 13817.)

wide, sparsely glandular setulose below intermixed with or replaced by an inconspicuous ground layer of sessile glandular hairs; bracteoles paired, sessile, and persistent, subulate to setiform, 1 mm long, essentially glabrous or with a sparse cover of sessile glandular hairs. Pedicels 1–4 mm long, beset with minute glandular hairs up to 0.5 mm long. Hypanthia (at anthesis) campanulate, 2–2.5 mm long to torus (vascular ring), moderately covered with spreading smooth glandular hairs 0.5–1 mm long intermixed with or replaced by a ground layer of sessile dot-like glandular hairs. Calyx closed in bud, crowned by an apiculum 0.5 mm long but rupturing regularly at anthesis into 5 triangular hyaline lobes  $2 \times 2$  mm; exterior calyx teeth 5, fused to calyx lobes for much of their length with the free subulate

portions projecting 0.25–0.5 mm from the distal portion of each calyx lobe. Petals 5, glabrous, white (fide Croat 37873), pink (fide Hartman 12458), or bluish-purple (fide Hartman 12404), obovate, rounded apically, 5–6 mm long and 3.5–5 mm wide, margin entire. Stamens 10, isomorphic; filaments glabrous, complanate, 2.5–3.5 mm long; anthers 1.5–2 mm long, 1 mm wide, laterally compressed and coherent in a ring, apex truncate to somewhat emarginate on ventral side; connective thickened dorsally and prolonged at base into a retrorse triangular appendage 1–1.5 mm long. Ovary inferior, 5-celled, sparingly glandular-setose at summit surrounding style base. Style straight, minutely papillate distally, 5.5–8.5 mm long and conspicuously overtopping surrounding stamen ring; stigma

truncate to capitellate. Berry reportedly blue at maturity, globose, 5–6 mm long, 5–6 mm in diameter. Seeds numerous, ovoid, white, 0.5 mm long with a shallowly scrobiculate testa.

ADDITIONAL SPECIMENS EXAMINED.—PANAMA. Darién: Cerro Mali, vicinity of base camp, 1,400 m, near Colombian border, 23 Jan. 1975, *Gentry & Mori 13817* (F, US); SW ridge leading to Alturas de Nique on border with Colombia, 1,100–1,200 m, 30 Dec. 1980, *Hartman 12404* (CAS); Alturas de Nique and ridge leading SW, 1,250–1,500 m, 31 Dec. 1980, *Hartman 12458* (CAS).

DISTRIBUTION.—A little-collected species of eastern Panama currently known from Cerro Mali in the Serranía del Darién and the region of Alturas de Nique in the Serranía de Pirre in southern Darién province near the Panama/Colombia frontier at 1,100–1,560 m.

PHENOLOGY.—Flowering specimens have been collected in July and December; the only known fruiting specimen was collected in January.

*Tococa croatii* is defined by its caducous cover of straight or crisped cauline hairs (1–2 mm long), regularly rupturing hyaline calyx, and shallowly scrobiculate, ovoid seeds. The most extraordinary feature of this species is the morphology of the anther thecae. These are distally truncate to emarginate with a comparatively broad terminal pore, laterally coherent in a ring, and beset dorsally with deflexed triangular appendages. Among described species of *Tococa*, *T. croatii* shares its habit, inflorescence architecture, staminal details, and fruit morphology only with *T. symphyandra* (Triana) Cogn. of Colombia and Ecuador. The consistent differences between these species involve foliage characters and pubescence details of the distal internodes, hypanthia and ovaries. *Tococa symphyandra* has long subtrorse-setose hairs (0.5–1.5 cm long) on young branchlets and petioles, didymous formicaria about 1 cm long that are immersed in the blade base, and essentially glabrous hypanthia and ovaries. The derived staminal characters that unite *T. croatii* and *T. symphyandra* as a distinctive species pair are also the features that make them anomalous members of the genus. These staminal characters would also make them equally anomalous if included in *Miconia* or any other genus of the Miconiaceae. Consequently, the precise relationships and best generic disposition for these two species must await detailed monographic studies of both *Miconia* and *Tococa*.

This species is named for Thomas B. Croat, a student of neotropical Araceae who has contrib-

uted significantly to our knowledge of the neotropical flora through his many fine collections and publications.

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